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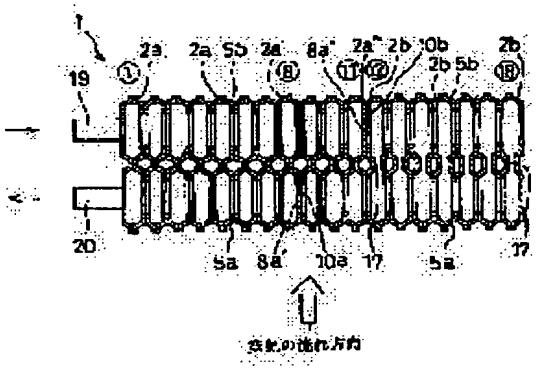
(54) HEAT EXCHANGER

(57)Abstract:
PROBLEM TO BE SOLVED: To make uniform the amount of heat exchange (degree of cooling) with air passing a heat exchanger having a plurality of channels.
SOLUTION: The heat exchanger has two heat exchanger bodies 18a and 18b in the direction of draft while being divided into two portions in the width direction of the heat exchanger, and allows a refrigerant to flow to the upstream heat exchanger body 18a from the downstream heat exchanger body 18b in the direction of draft. The heat exchanger body 18b comprises first and second channels 22 and 23, and the heat exchanger body 18a comprises third and fourth channels 24 and 25. By allowing the number of tubes 6a and 6b for composing the channels 22, 23, 24, and 25 to differ, a part where temperature is high is overlapped with a part where temperature is low, thus making uniform the degree of cooling.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] The heat exchanger characterized by making it change the number of the tube which defines the assembly of a tube and constitutes each passage so that two or more passage which counters each heat exchanger object may be obtained by the upstream and the downstream while at least 2 ****s is carried out in the cross direction of a heat exchanger, having two or more heat exchanger objects in the ventilation direction and pouring a refrigerant from the heat exchanger object of the ventilation direction downstream to the heat exchanger object of the upstream.
[Claim 2] The assembly of a tube is a heat exchanger according to claim 1 characterized by changing the number of a tube, when it becomes settled by partition and the batch parts of a tank differ.
[Claim 3] Claim 1 or 2 characterized by the tube number of the 2nd passage making [more] it than the tube number of the 3rd passage in what has two passage in the heat exchanger object of the upstream, and has two passage in the heat exchanger object of the downstream Heat exchanger of a publication.
[Claim 4] Claim 1 or 2 characterized by the tube number of the 2nd passage making it fewer than the tube number of the 3rd passage in what has two passage in the heat exchanger object of the upstream, and has two passage in the heat exchanger object of the downstream Heat exchanger of a publication.
[Claim 5] The heat exchanger according to claim 1 or 2 characterized by making it change the number of the tube which has two passage in the heat exchanger object of the upstream, has three passage in the heat exchanger object of the downstream, and constitutes each passage of the upstream, and the number of the tube which constitutes each passage of the downstream.
[Claim 6] While at least 2 ****s is carried out in the cross direction of a heat exchanger, having two or more heat exchanger objects in the ventilation direction and pouring a refrigerant from the heat exchanger object of the ventilation direction downstream to the heat exchanger object of the upstream, on each heat exchanger object The number of a tube is made equal at the upstream and the downstream so that two or more passage which counters may be obtained. And the heat exchanger characterized by considering as the number to 1/2 of the number of tanks of a tank group which has the tube element in which this free passage way was formed at least from two in the free passage way from said downstream to the upstream.
[Claim 7] Have two passage, the 1st and the 2nd, in the heat exchanger object of the downstream, and it has two passage, the 3rd and the 4th, in the heat exchanger object of the upstream. To the heat exchanger of four pass which pours a refrigerant from the heat exchanger object of said downstream to the heat exchanger object of the upstream, **, The heat exchanger according to claim 6 characterized by making into the number to 1/2 of the number of tanks of the tank group of a configuration the free passage way which pours a refrigerant from said 2nd passage to the 3rd passage from the tank of the tube element which constitutes said 2nd and 3rd passage from two.
[Claim 8] While at least 2 ****s is carried out in the cross direction of a heat exchanger, having two or more heat exchanger objects in the ventilation direction and pouring a refrigerant from

the heat exchanger object of the ventilation direction downstream of the heat exchanger object of the upstream, on each heat exchanger object The heat exchanger according to claim 6 characterized by having made the number of a tube equal at the upstream and the downstream, and allotting the free passage way from said downstream to the upstream to the both ends of the tank group of the downstream 2 sets so that two or more passage which counters may be obtained.

[Claim 9] Have two passage, the 1st and the 2nd, in the heat exchanger object of the downstream, and it has two passage, the 3rd and the 4th, in the heat exchanger object of the upstream. To the heat exchanger of four pass which pours a refrigerant from the heat exchanger object of said downstream to the heat exchanger object of the upstream, **, The heat exchanger according to claim 6 characterized by allotting 2 sets to the both ends of the tank group of a configuration from the tank of a tube element by which the free passage way which pours a refrigerant to the 3rd passage constitutes said the 2nd passage and 3rd passage from said 2nd passage.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the heat exchanger used for a car air-conditioner etc. as an evaporator.
[0002]
[Description of the Prior Art] Conventionally, the heat exchanger of a laminating mold is used as a heat exchanger for evaporators. Manufacture of this laminating type of heat exchanger manufactures the shaping plate with which the bulge section for tube formation of the pair which leads to each bulge section for tank formation of said both ends on both sides of the protruding line extended to between the bulge sections for tank formation of the pair of the other end from between the bulge section for tank formation of the pair which has a free passage hole in both ends first, and the bulge section for tank formation of the pair of an end was formed. And after carrying out the laminating of the corrugated fin by turns and fixing to a jig the tube element which these shaping plates consisted of by carrying out confrontation junction, it is brazed among a furnace and manufactured.
[0003] By changing into the batch shaping plate which does not have the tank which adjoins each other in the tank of the tube element of middle, and the free passage hole of a free passage in this heat exchanger, as shown in drawing 9 , the flow of a refrigerant serves as four so-called pass. That is, the refrigerant containing from the inlet port of a refrigerant goes up the 1st leeward passage, descends in the 2nd passage, and goes up the 3rd passage of a windward further, and descends the 4th passage, and flows out of a refrigerant outlet.
[0004]
[Problem(s) to be Solved by the Invention] The air which flows the inside of an air-conditioning duct results [from an arrow head] in a heat exchanger E, and in case it passes, heat exchange of it is carried out and it is cold-blast-ized. However, even if it was the heat exchanger of four pass, the tube skin temperature on the leeward of the heat exchanger was not so uniform as the dotted line shown in drawing 10 , and was making the temperature unevenness of the air to pass. The part with temperature higher a maximum of about 2 degrees C than other parts was in the 11th thru/or the 14th tube by the side of a batch plate especially in the 2nd passage. Since many refrigerants in the 15th to the 18th back tube which flow the inside of a tank flowed as the cause, a result which is dragged by it and flow was brought, and uneven temperature was to appear.
[0005] In this invention, it is in a heat exchanger with two or more passage, and aims at equalizing the amount of heat exchange with the air which passes this heat exchanger (whenever [cooling]).
[0006]
[Means for Solving the Problem] They are to have made it change the number of the tube which defines the assembly of a tube and constitutes each passage by the upstream and the downstream so that two or more passage which counters each heat exchanger object may be obtained, while at least 2 ****s of the heat exchangers of this invention are carried out in the cross direction of a heat exchanger, they have two or more heat exchanger objects in the

ventilation direction and pour a refrigerant from the heat exchanger object of the ventilation direction downstream to the heat exchanger object of the upstream (claim 1).
[0007] Whenever [cooling / of the air which becomes possible / lapping / and passes a part with high temperature and a low part by this from the difference of the number of the tube of each passage of the heat-exchanger object of the downstream and the number of the tube of each passage of the heat-exchanger object of the upstream] can be equalized.
[0008] Moreover, the assembly of said tube becomes settled by partition, and when the batch parts of a tank differ, it is to have changed the number of a tube (claim 2). And by some which have two passage in the heat exchanger object of said upstream, and have two passage in the heat exchanger object of the downstream, the tube number of the 2nd passage is conversely again for the tube number of the 2nd passage to have made [having made / more / it than the tube number of the 3rd passage (claim 3) or] it fewer than the tube number of the 3rd passage (claim 4). Thereby, in the so-called heat exchanger of four pass, if the difference of a tube number with the 3rd passage produces the 2nd passage, it can lap, whether which is large or small, and the operation effectiveness with uniform temperature will be acquired.
[0009] Furthermore, it has two passage in the heat exchanger object of the upstream, has three passage in the heat exchanger object of the downstream, and is in having made it change the number of the tube which constitutes each passage of the upstream, and the number of the tube which constitutes each passage of the downstream (claim 5). Thereby, this invention can be used also for the so-called heat exchanger of five pass, and the ununiformity of whenever [cooling / of the air had and passed] can be corrected.
[0010] Moreover, while at least 2 ****s of the heat exchangers of this invention are carried out in the cross direction of a heat exchanger, they have two or more heat exchanger objects in the ventilation direction and pouring a refrigerant from the heat exchanger object of the ventilation direction downstream to the heat exchanger object of the upstream The number of a tube is made equal at the upstream and the downstream so that two or more passage which counters each heat-exchanger object may be obtained. And it is in having considered as the number to 1/2 tanks of the tank group which has the tube element in which this free passage way was formed at least from two in the free passage way from said downstream to the upstream (claim 6). And [claim 7 used also for the thing of four pass as a heat exchanger. A free passage way serves as a number to 1/2 of the number of tanks of a tank group from two by this, a refrigerant comes to flow from the this free passage way by increase of resistance since equally [a rear spring supporter] to the whole passage (the heat exchanger of four pass the 2nd passage) of the configuration from two or more tubes of the upstream, and the ununiformity of temperature is prevented.
[0011] Moreover, while at least 2 ****s of the heat exchangers of this invention are carried out in the cross direction of a heat exchanger, they have two or more heat exchanger objects in the ventilation direction and pouring a refrigerant from the heat exchanger object of the ventilation direction downstream to the heat exchanger object of the upstream It is in having made the number of a tube equal at the upstream and the downstream, and having allotted the free passage way from said downstream to the upstream to the both ends of the tank group of the downstream 2 sets so that two or more passage which counters each heat-exchanger object may be obtained (claim 8). and — as a heat exchanger — that of four pass — being also alike — it is used (claim 9). Since a free passage way is located to the both ends of the tank group of the downstream and a refrigerant flows from the free passage way of the both sides of this ** by this, from two or more tubes before and behind a free passage way, a refrigerant flows equally [a rear spring supporter] to the whole passage (the heat exchanger of four pass the 2nd and 3rd passage) of a configuration, and temperature can be equalized.
[0012]
[Embodiment of the Invention] Hereafter, the gestalt of implementation of this invention is explained based on a drawing.
[0013] The gestalt of the 1st operation is shown in drawing 1 thru/or drawing 3 , and a heat exchanger 1 is a lamination type thing. It is prepared in both ends the tanks 4a and 4b of a pair and 5a and 5b, and between them. Two or more step (18 steps) laminating of tube element 2a,

2b, and the corrugated fin with two tubes 6a and 6b which open this tank for free passage which carry out the following is carried out by turns, and it is brazed among a furnace and manufactured.

[0014] The above mentioned tube element 2a is used from drawing 1 and 2 top left-hand side to the 11th. Shaping plate 8a shown in drawing 4 carries out two-sheet confrontation junction, and is constituted. This shaping plate 8a to both ends The bulge sections 9a and 9b for tank formation of a pair, and 10a and 10b, The bulge sections 11a and 11b for tube formation with which the bulge sections 9a and 10a for tank formation, and 9b and 10b of those are connected, It has the protruding line 12 which divides said bulge sections 11a and 11b for tube formation, and the free passage holes 13 and 14 are formed in the bulge sections 9a and 9b for tank formation, and said 10a and 10b.

[0015] Moreover, tube element 2b is used from the 12th to the 18th from said drawing 1 R> 1 and 2 top left-hand side. Shaping plate 8b shown in drawing 5 carries out two-sheet confrontation junction, and is constituted, and this shaping plate 8b has the same configuration as said shaping plate 8a (the same component attaches the same number and omits explanation.). It has the free passage slot 16 which opens between the downward bulge sections 10a and 10b for tank formation for free passage. It is the free passage way 17 where a refrigerant flows to tank 5a from tank 5b in this free passage slot at the time of confrontation junction.

[0016] In addition, it is in shaping plate 8a[of 8th tube element 2a' (plasmodium of the tube element 2)] ' from said drawing 1 and 2 top left-hand side. Even if it is the batch plate which does not have a free passage hole in bulge section 10a for tank formation and is in shaping plate 8a[of 11th tube element 2a" (plasmodium of the tube element 2)] ' from said drawing top left-hand side It is the batch plate which does not have the free passage hole 14 in bulge section 10b for tank formation.

[0017] The heat exchanger 1 with such tube element 2a and 2b If it sees from the flow of a refrigerant as shown in drawing 6 , it will dissociate crosswise [of a heat exchanger 1]. It is divided in the ventilation direction by heat exchanger object 18a of the upstream, and heat exchanger object 18b of the downstream. A refrigerant goes into tank 5b (the 1st tank T1) of 11 tube element 8a of heat-exchanger object 18b of the downstream from the refrigerant inlet port 19, goes up the 1st passage 22 which consists of 11 tube 6b, and enters within [tank 4b (left-hand side part of the 2nd tank group T2)] the 11 same pieces.

[0018] And it flows to the right-hand side part of the 2nd tank group T2, the 2nd passage 23 which consists of eight tube 6b is descended, and it goes into eight tank 5b (3rd tank T3). And eight free passage ways 17 which consist of the free passage slot 16 are flowed, and it results in ten tank 5a (4th tank T four) of tube element 2b of heat-exchanger object 18a of the upstream. And the 3rd passage 24 which consists of ten tube 6a is gone up, and it goes into ten tank 4a (right-hand side part of the 5th tank T5), and flows to tank 4of tube element 2a a (left-hand side part of the 5th tank T5). And the 4th passage 25 of eight tube 6a is descended, and it results in eight tank 5a (the 6th tank T6), and flows out of the refrigerant outlet 20.

[0019] That is, for the number of the tube of the 1st passage 22, the number of the tube of 11 and the 2nd passage 23 is [the number of the tube of 10 and the 4th passage 25 of the number of the tube of 7 and the 3rd passage 24] eight as each passage by the assembly of a tube was mentioned above. This is determined by the location of batch plate 8a' of the shaping plate which constitutes each tube element.

[0020] Thereby, the batch location (location of batch plate 8a') of heat exchanger object 18a of the upstream and heat exchanger object 18b of the downstream is shifted, and, therefore, a part with the high temperature by the side of the batch plate of the 2nd passage 23 laps with a part with the low temperature of the 3rd passage 24. That is, a part with the high temperature of each passage and a low part can be piled up, and the skin temperature of a tube is equalized like the continuous line of drawing 10 .

[0021] In drawing 7 , the gestalt of implementation of the 2nd of this invention is shown, the heat exchanger 1 in this example is the so-called thing of four pass, and the batch location differs from the gestalt of said 1st operation. Namely, in heat exchanger object 18b of the downstream,

the batch location (namely, location of batch plate 8a') of the 1st passage 22 and the 2nd passage 23 is located in the 9th location, and while the tube number of the 2nd passage 23 has become nine The batch location (namely, location of batch plate 8') of the 3rd passage 24 of heat exchanger object 18a of the upstream and the 4th passage 25 is located in the 11th location, and the tube number of the 3rd passage 24 has become seven.

[0022] Also in this 2nd example, a part with the high temperature of the 2nd passage 23 laps with a part with the low temperature of the 3rd passage 24 or the 4th passage 25, and can equalize the skin temperature of a tube. In addition, the same part as the gestalt of said 1st operation attached the same sign, and omitted explanation.

[0023] In drawing 8 , although the gestalt of implementation of the 3rd of this invention is shown, the heat exchanger 1 in this example is the so-called thing of five pass and a batch location is one piece in heat exchanger object 18a of the upstream, in heat exchanger object 18b of the downstream, they are two pieces. That is, in heat exchanger object 18b of the downstream, the batch location (namely, location of batch plate 8') of the 1st passage 22 and the 2nd passage 23 is in the 6th, and the batch location (namely, location of batch plate 8') of the 2nd passage 23 and the 3rd passage 24 has become the 12th. Therefore, the tube number of the 1st, 2nd, and 3rd passage 22, 23, and 24 has become six at a time.

[0024] Moreover, in heat exchanger object 18a of the upstream, the batch location (namely, location of batch plate 8') of the 4th passage 25 and the 5th passage 26 is in the 9th, and both the tube numbers of the 4th passage 25 and the 5th passage 26 have become nine.

[0025] Also in this 3rd example, a part with the high temperature of the 2nd and 3rd passage overlaps a part with the low temperature of the 4th and 5th passage, and can equalize the skin temperature of each tube. In addition, the same part as the gestalt of said 1st operation attached the same sign, and omitted explanation.

[0026] In drawing 11 and drawing 12 , the gestalt of the 4th operation is shown, and with the gestalt of operations from the 1st to the 3rd, although it was use by the heat exchanger of a lamination mold Using two tubes 40a and 40b which became independent in this example, the laminating (23 steps) of these tubes 40a and 40b and the fin 43 is carried out by turns, a upper tank 41 and a lower tank 42 are arranged on the both ends of the tubes 40a and 40b concerned, and it is use of invention in the heat exchanger 1 of a configuration.

[0027] Tubes 40a and 40b are the pipes of the shape of flat [which became independent, respectively], a upper tank 41 is a thing in the shape of ** by which extrusion molding was carried out, and two ** 45a and 45b are formed in both sides by the septum 44 which accompanied the interior at the longitudinal direction. Same number individual formation of the insertion holes 46 and 46 with which said tubes 40a and 40b are inserted is carried out with the number of tubes on the inferior surface of tongue which constitutes both these ** 45a and 45b.

[0028] Extrusion molding of the lower tank 42 was carried out, and two ** 48a and 48b are formed in both sides by the septum 47 which accompanied the interior at the longitudinal direction. Same number individual formation of the insertion hole 49 with which said tubes 40a and 40b are inserted, and 49 is carried out with the number of tubes on the top face which constitutes both these ** 48a and 48b.

[0029] Moreover, in one **48a of a lower tank 42, bridge wall 51a is formed the 10th of drawing top Z-twist tube 40a, and 11th in between, and this ** 48a is divided into two by 48a-1 and 48a-2 by the longitudinal direction. Moreover, in **48b, bridge wall 51b is formed the 14th of drawing top Z-twist tube 40b, and 15th in between, and this ** 48b is separated into 2 ** 48b-1 and 48a-2 by the longitudinal direction. And notching of the septum 47 is carried out and ** 48b-2 and ** 48a-2 are in the free passage condition. In addition, the hole with which, as for 52b, the inlet-port pipe 53 with which a refrigerant flows is inserted, and 52a are holes with which the outlet pipe 54 with which a refrigerant flows out is inserted.

[0030] If it sees from the flow of a refrigerant as the heat exchanger 1 of such a configuration is shown in drawing 13 Dissociate crosswise [of a heat exchanger 1] and it is divided in the ventilation direction by heat exchanger object 18a of the upstream, and heat exchanger object 18b of the downstream. A refrigerant goes into ** 45b-1 of the bottom tank 42 divided by bridge wall 51b located from the inlet-port pipe 53 between the 14th of heat-exchanger object 18b of

the downstream, and the [redacted]th tube. And the 1st passage 22 which consists of 14 tube 40b is gone up, and it enters in ** 45b of a upper tank 41.
[0031] And the inside of ** 45b is flowed to a longitudinal direction, the 2nd passage 23 which consists of nine tube 40b is descended, and it enters in b-** 482 of a lower tank 42. And it flows to ** 48b-2 and ** 48a-2 of the lower tank 42 of heat exchanger object 18a of the upstream of a free passage. And the 3rd passage 24 which consists of 13 tube 40a is gone up, and it results in ** 45a of a upper tank 41. And the inside of ** 45a is flowed to a longitudinal direction, the 4th passage 25 of ten tube 40a is descended, and it results in ** 45a-1 of a lower tank 42, and flows out of the refrigerant outlet pipe 54.
[0032] That is, for the number of the tube of the 1st passage 22, the number of the tube of 14 and the 2nd passage 23 is [the number of 13 and the 4th tube of the number of 9 and the 3rd tube] ten as the passage by the assembly of a tube was mentioned above. This is determined by the location where each bridge walls 51a and 51b are formed in ** 45a and 45b of a lower tank 42. Thereby, the bridge walls 51a and 51b of heat exchanger object 18a of the upstream and heat exchanger object 18b of the downstream are shifted, and, therefore, a part with the high temperature of the tube near bridge wall 51b of the 2nd passage 23 laps with a part with the low temperature of the 3rd passage 24. By this, the tube skin temperature of the downstream also falls, and it becomes other parts and this temperature about the air temperature which passes through this, and becomes whenever [uniform blow-off temperature].
[0033] With the 5th after drawing 14 , and the gestalt of the 6th operation, it is in the so-called heat exchanger 1 of four pass, the flow of a refrigerant tends to be improved, without moving a bridge wall, and it is going to offer the good heat exchanger of temperature distribution.
[0034] The gestalt of the 5th operation is shown in drawing 14 thru/or drawing 16 , and a heat exchanger 1 is a lamination type thing. To both ends, the tanks 4a and 4b of a pair, and 5a and 5b, Two or more step (18 steps) laminating of tube element 2a, 2b, and the corrugated fin 3 with two tubes 6a and 6b which are prepared between them and open this tank for free passage is suitably carried out by turns with combination, and it is brazed among a furnace and manufactured. Tube element 2b is used [from the 1st Z twist of drawing 15 R> 5 to the 16th] for the 17th and the 18th by tube element 2a.
[0035] Shaping plate 8a as the above mentioned tube element 2a been the same configuration as drawing 3 mentioned above and shown in drawing 4 carries out two-sheet confrontation junction, and is constituted. This shaping plate 8a To both ends, the bulge sections 9a and 9b for tank formation of a pair, and 10a and 10b, The bulge sections 11a and 11b for tube formation with which the bulge sections 9a and 10a for tank formation, and 9b and 10b of those are connected, It has the protruding line 12 which divides said bulge sections 11a and 11b for tube formation, and the free passage holes 13 and 14 are formed in the bulge sections 9a and 9b for tank formation, and said 10a and 10b.
[0036] moreover, two shaping plate 8b shown in said drawing 5 carried out joins, and constitutes tube element 2b -- having -- **** -- this shaping plate 8b -- the same configuration as said shaping plate 8a -- having (the same component attaching the same number and omitting explanation.) -- it has the free passage slot 16 which opens between the downward bulge sections 10a and 10b for tank formation for free passage. It is the free passage way 17 where a refrigerant flows to tank 5a from tank 5b in this free passage slot at the time of confrontation junction.
[0037] In addition, 9th tube element 2a' of said drawing 15 is a modification, and has become the batch plate which does not have a free passage hole in the bulge sections 9a and 9b for tank formation of shaping plate 8a' which constitutes Tanks 5a and 5b.
[0038] The heat exchanger 1 with such tube element 2a and 2b If it sees from the flow of a refrigerant as shown in drawing 16 , it will dissociate crosswise [of a heat exchanger 1]. It is divided in the ventilation direction by heat exchanger object 18a of the upstream, and heat exchanger object 18b of the downstream. A refrigerant goes into tank 5b (1st tank group T1) of nine tube element 8a of heat-exchanger object 18b of the downstream from the refrigerant inlet port 19, goes up the 1st passage 22 which consists of nine tube 6b, and enters in tank 4b (left-hand side part of the 2nd tank group T2).

[0039] And it flows to the right-hand side part of the 2nd tank group T2, the 2nd passage 23 which consists of nine tube 6b is descended, and it goes into tank 5b (3rd tank group T3). And two free passage ways 17 of the 17th of the heat exchanger 1 shown in drawing 15 and 18th tube element 2b are flowed, and it results in tank 5a (a part of 4th tank group T four is accomplished.) of tube element 2b of heat-exchanger object 18a of the upstream, and flows also into tank 5of other tube element 2a a (a part of 4th tank group T four is accomplished).
[0040] thus, the time of the flow of the refrigerant from the 2nd passage 23 to the 3rd passage -- a refrigerant -- 3rd tank group T3 of the lower limit of the 2nd passage 23 -- it is -- the free passage way 17 -- this -- it is in the edge of the 3rd tank 5b group, and a refrigerant will be poured through the free passage way 17 of the 17th and 18th tube element 2b. Therefore, resistance increases by the free passage way 17, and it has, is in the 2nd passage 23, and a refrigerant comes to flow also to 10th, 11th, and 12th tube element 2a, and the rise of temperature is suppressed and it can equalize.
[0041] And a refrigerant goes up the 3rd passage 24 which consists of nine tube 6a, and results in tank 4a (right-hand side part of the 5th tank group T5). And it flows to tank 4of tube element 2a a (left-hand side part of the 5th tank group T5), the 4th passage 25 of nine tube 6a is descended, and it results in tank 5a (6th tank group T6), and flows out of the refrigerant outlet 20.
[0042] The gestalt of the 6th operation is shown in drawing 17 thru/or drawing 19 , and ** and a heat exchanger 1 are lamination type things. Two or more step (18 steps) laminating of tube element 2a, 2b, and the corrugated fin 3 with two tubes 6a and 6b which are prepared in both ends the tanks 4a and 4b of a pair and 5a and 5b, and between them, and open this tank for free passage is suitably carried out by turns with combination, and it is brazed among a furnace and manufactured.
[0043] From drawing 17 and the 1st Z twist of 18, tube element 2a is used from the 11th to the 16th even with the 9th, and, as for the 10th, the 17th, and the 18th, tube element 2b is used. In addition to the gestalt of the 5th operation, the gestalt of this 6th operation establishes the free passage way 17 in 10th tube element 2b. That is, the free passage way 17 is established in the both ends of tank group T3.
[0044] The heat exchanger 1 with such tube element 2a and 2b If it sees from the flow of a refrigerant as shown in drawing 19 , it will dissociate crosswise [of a heat exchanger 1]. It is divided in the ventilation direction by heat exchanger object 18a of the upstream, and heat exchanger object 18b of the downstream. A refrigerant is tank 5b of nine tube element 8a of heat-exchanger object 18b of the refrigerant inlet port 19 to the downstream (it goes into the 1st tank T1, and the 1st passage 22 which consists of nine tube 6b is gone up, and it enters in tank 4b (left-hand side part of the 2nd tank T2).).
[0045] And it flows to the right-hand side part of the 2nd tank, the 2nd passage 23 which consists of nine tube 6b is descended, and it goes into tank 5b (3rd tank T3). And the 10th of the heat exchanger 1 of drawing 1818 and the 17th, and the 18th tube element (26) free-passage way 17 are flowed, and it results in tank 5a (a part of 4th tank T four is accomplished.) of tube element 2b of heat-exchanger object 18a of the upstream, and flows also into tank 5of other tube element 2a a (a part of 4th tank T four is accomplished.).
[0046] thus, the time of the flow of the refrigerant from the 2nd passage 23 to the 3rd passage 24 -- 3rd tank group T3 of the lower limit of the 2nd passage 23 -- it is -- the free passage way 17 -- this -- it is in the both ends of 3rd tank group T3, it will divide into the free passage way 17 of 10th tube element 2b, the 17th, and 18th tube element 2b, and a refrigerant will flow. Therefore, by having given the flow 10th near tube element 2b of the 2nd passage 23 especially, the rise of temperature is suppressed and it can equalize.
[0047] And the 3rd passage 24 which consists of nine tube 6a is gone up, and it results in tank 4a (right-hand side part of the 5th tank group T5). And it flows to the left-hand side part of the 5th tank group T5, the 4th passage 25 of nine tube 6a is descended, and it results in tank 5a (the 5th tank T5), and flows out of the refrigerant outlet 20.
[0048] the free passage way 17 which the gestalt of such implementation of the 6th of a configuration moves to the 3rd passage 24 from the 2nd passage 23 -- right and left of 3rd tank

T3 — since it is formed separately, the fluidity of the refrigerant of the tube element of the 10th neighborhood increases on the free passage way of the 10th neighborhood, and homogeneity cooling of the air which the cooling effect improves and passes by this can be carried out.
[0049] In drawing 20 , if the gestalt of implementation of the 7th of this invention is explained, the same invention as the gestalt of the 5th and the 6th operation which these tubes 40a and 40b, the fin 41, and the lower tank 42 were arranged, and was described above also to the heat exchanger 1 of a configuration can be carried out using the tubes 40a and 40b of the independent pair.
[0050] In this example, the free passage way 56 is established in the septum 47 which divides ** 48a-2 as well as ** 48b-2 of the bottom tank 42. Two free passage ways 56 are formed, respectively as an example over the gestalt of the 6th operation of one free passage way 56 as an example to the gestalt of the 5th operation. Also by this, a refrigerant comes to flow to the 3rd passage the tube at large which constitutes the 2nd passage, and at large, and it can provide them with the good heat exchanger of temperature distribution. In addition, the same part as the heat exchanger shown with the gestalt of said 4th operation attached the same sign, and omitted explanation.
[0051]
[Effect of the Invention] As mentioned above, if it is in claim 5 from claim 1, whenever [cooling / of the air which becomes possible / lapping a part with high temperature and a low part / from the difference of the tube number of each passage of the heat-exchanger object of the upstream of the ventilation direction and the heat-exchanger object of the downstream, and is passed] can be equalized.
[0052] moreover, equal in the tube number from which each passage of the heat-exchanger object of the ventilation direction upstream and the heat-exchanger object of the downstream is obtained, if it is in claim 9 from claim 6 at the upstream and the downstream — by the thing, whenever [cooling / of the air which a refrigerant comes to flow equally and passes through the inside of each refrigerant passage from the number and location of a free passage way from the downstream to the upstream] can be equalized the bottom.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the front view of a heat exchanger showing the gestalt of implementation of the 1st of this invention.
[Drawing 2] It is a cross-sectional view near the tank group of the lower part of a heat exchanger same as the above.
[Drawing 3] It is the perspective view of a tube element same as the above.
[Drawing 4] It is the perspective view of a shaping plate same as the above.
[Drawing 5] It is the perspective view of other shaping plates same as the above.
[Drawing 6] It is the explanatory view having shown the flow of the refrigerant in the heat exchanger of the gestalt of the 1st operation.
[Drawing 7] It is the explanatory view having shown the flow of the refrigerant in the heat exchanger which shows the gestalt of implementation of the 2nd of this invention.
[Drawing 8] It is the explanatory view having shown the flow of the refrigerant in the heat exchanger which shows the gestalt of implementation of the 3rd of this invention.
[Drawing 9] It is the explanatory view having shown the flow of the refrigerant in the conventional heat exchanger.
[Drawing 10] It is the characteristic ray Fig. showing the skin temperature of the tube of the conventional heat exchanger and the heat exchanger of this invention.
[Drawing 11] It is the perspective view of a heat exchanger showing the gestalt of implementation of the 4th of this invention, and is **.
[Drawing 12] It is a decomposition perspective view same as the above.
[Drawing 13] It is the explanatory view having shown the flow of the refrigerant of a heat exchanger same as the above.
[Drawing 14] It is the front view of a heat exchanger showing the gestalt of implementation of the 5th of this invention.
[Drawing 15] It is a cross-sectional view near the lower-tank group of a heat exchanger same as the above.
[Drawing 16] It is the explanatory view having shown the flow of the refrigerant of a heat exchanger same as the above.
[Drawing 17] It is the front view having shown the gestalt of implementation of the 6th of this invention.
[Drawing 18] It is a cross-sectional view near the lower-tank group of a heat exchanger same as the above.
[Drawing 19] It is the explanatory view having shown the flow of the refrigerant of a heat exchanger same as the above.
[Drawing 20] It is the decomposition perspective view having shown the gestalt of implementation of the 7th of this invention.
[Description of Notations]
1 Heat Exchanger
2a, 2b Tube element
3 Corrugated Fin

4a, 4b Tank
5a, 5b Tank
6a, 6b Tube
8a Shaping plate
8a' Batch plate
13 14 Free passage hole
16 Free Passage Slot
17 Free Passage Way
18a, 18b Heat exchanger object
22 1st Passage
23 2nd Passage
24 3rd Passage
25 4th Passage
26 5th Passage
40a, 40b Tube
41 Upper Tank
42 Lower Tank
44 Septum
45a, 45b Room
46 Insertion Hole
47 Septum
48a, 48b Room
51a, 51b Bridge wall
56 Free Passage Way

[Translation done.]

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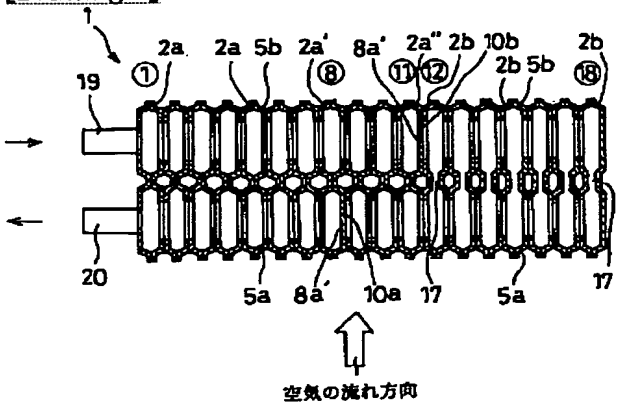
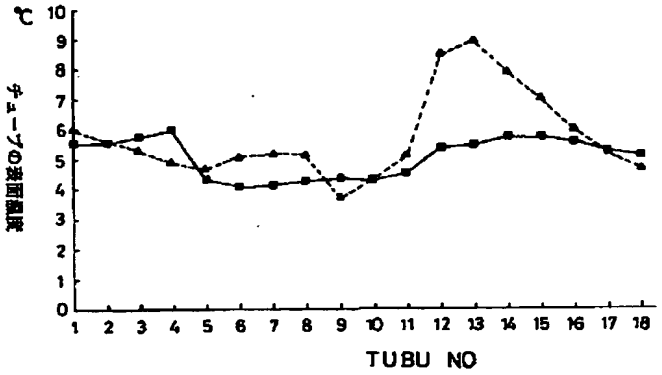
DRAWINGS

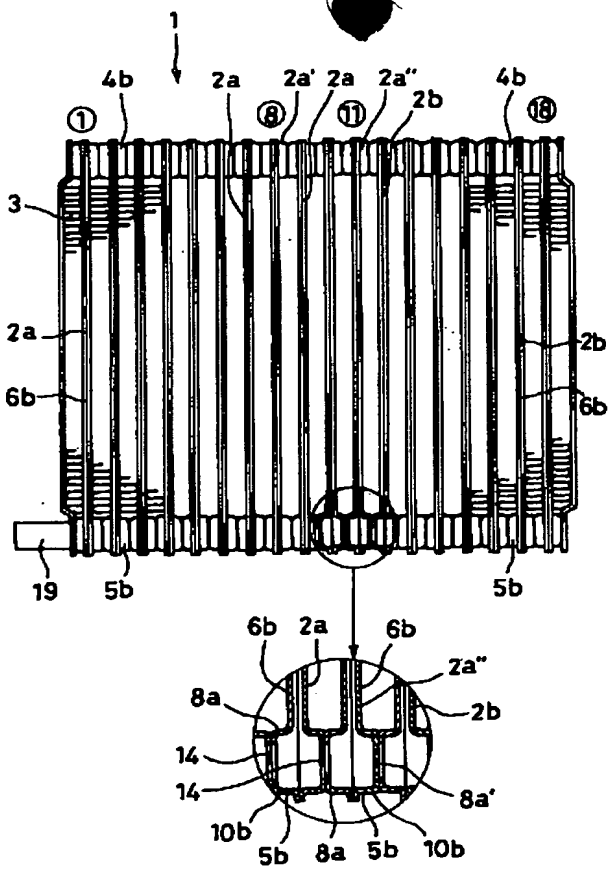
[Drawing 2]



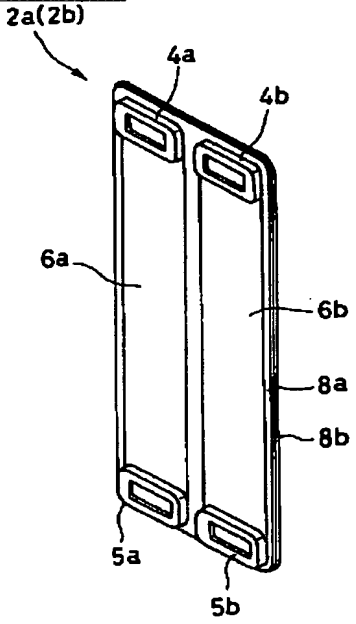
[Drawing 10]



[Drawing 1]



[Drawing 3]



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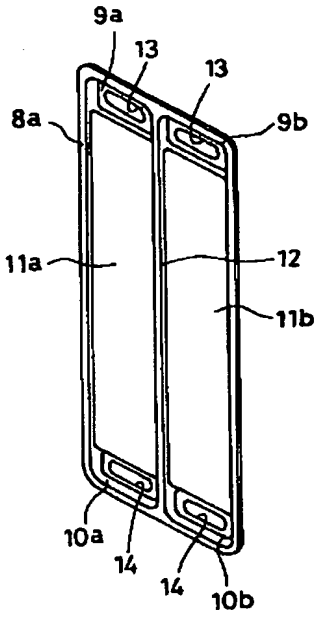
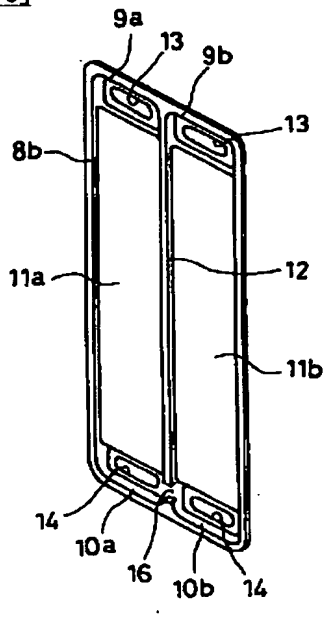
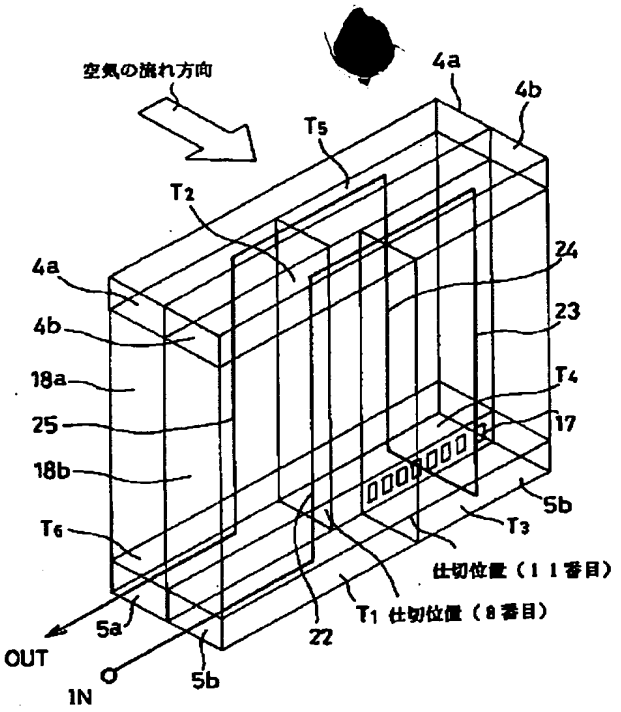


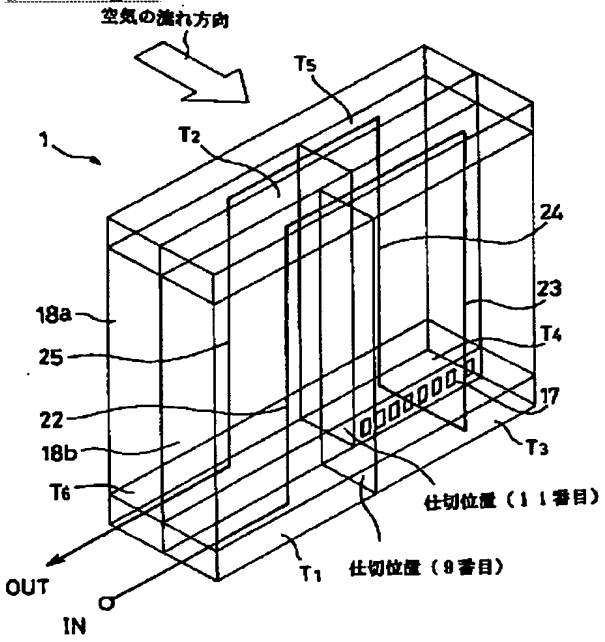
[Drawing 5]



[Drawing 6]



[Drawing 7]



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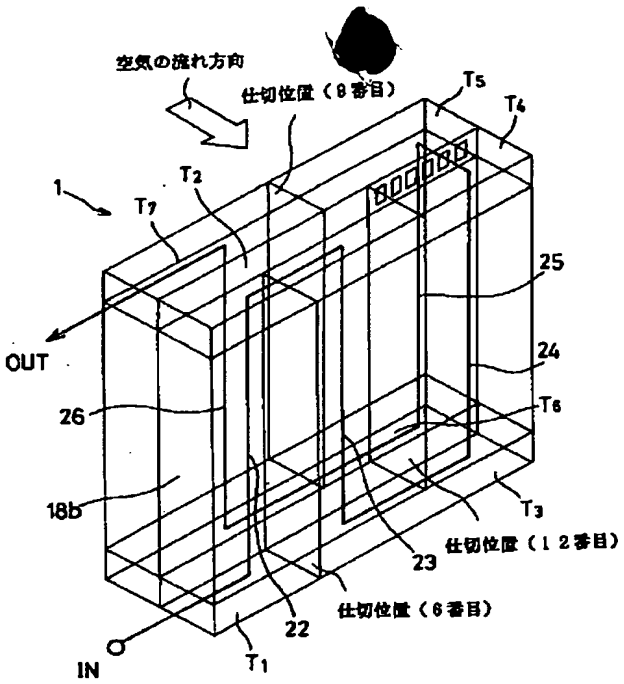
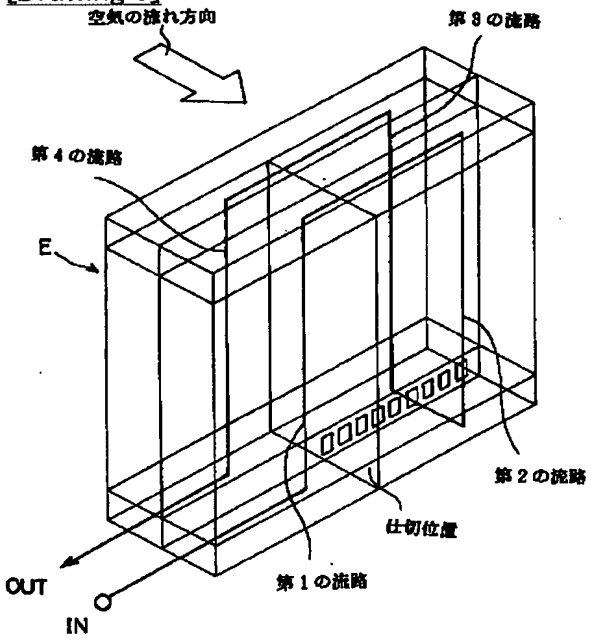
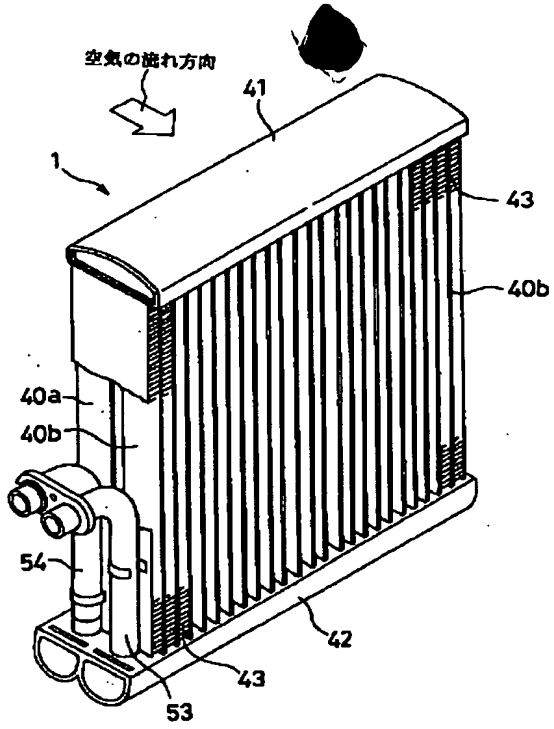


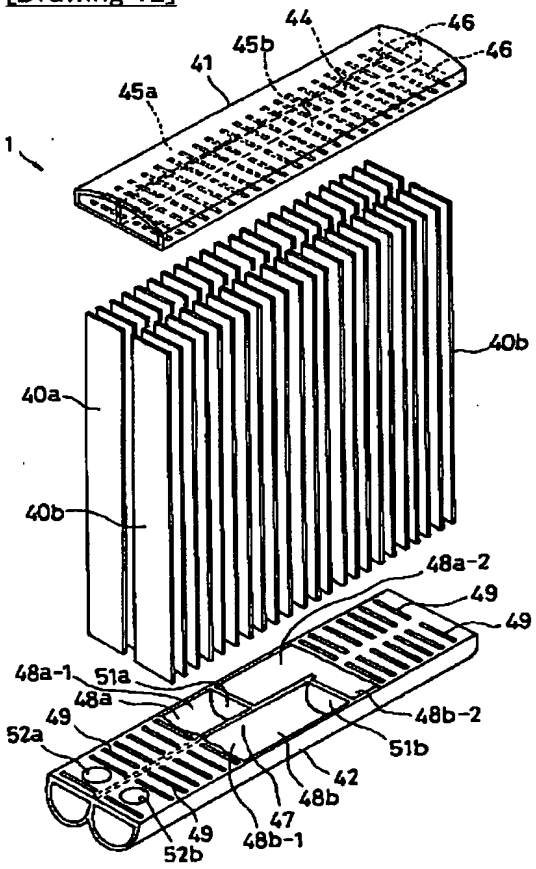
[Drawing 9]



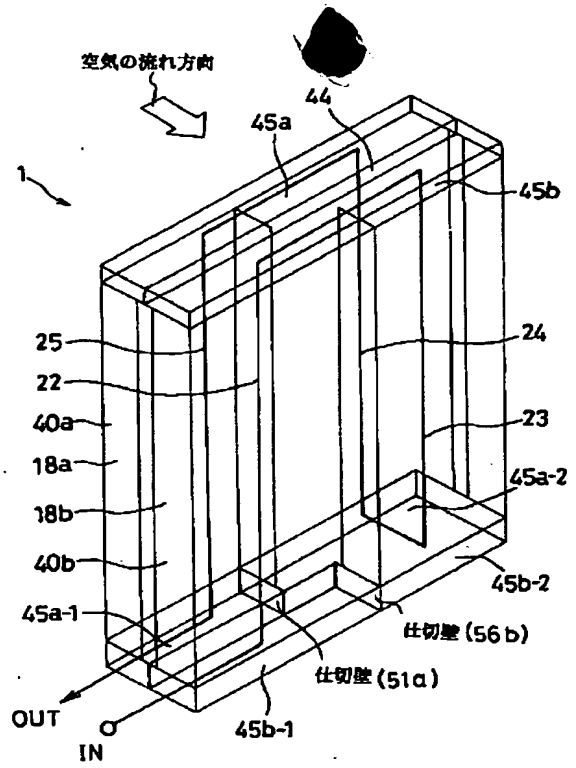
[Drawing 11]



[Drawing 12]



[Drawing 13]



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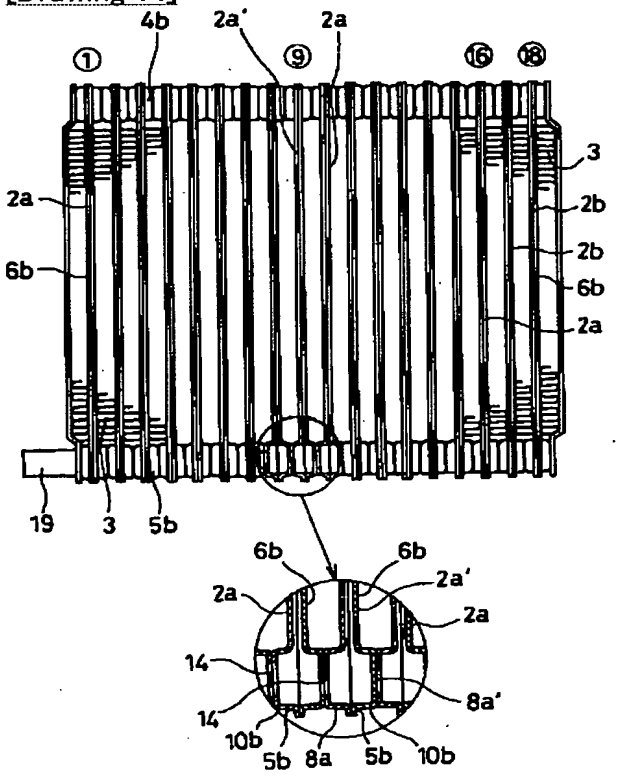

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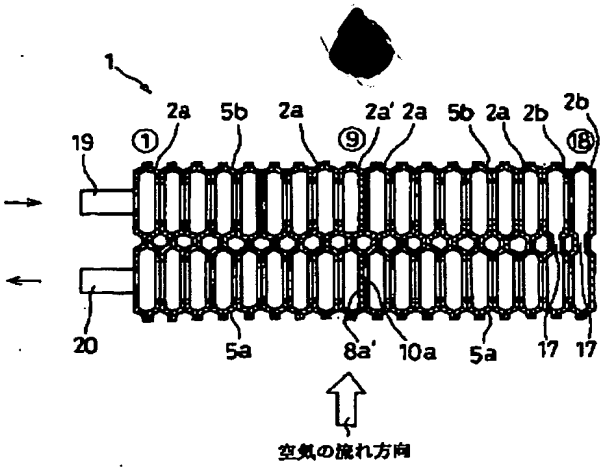

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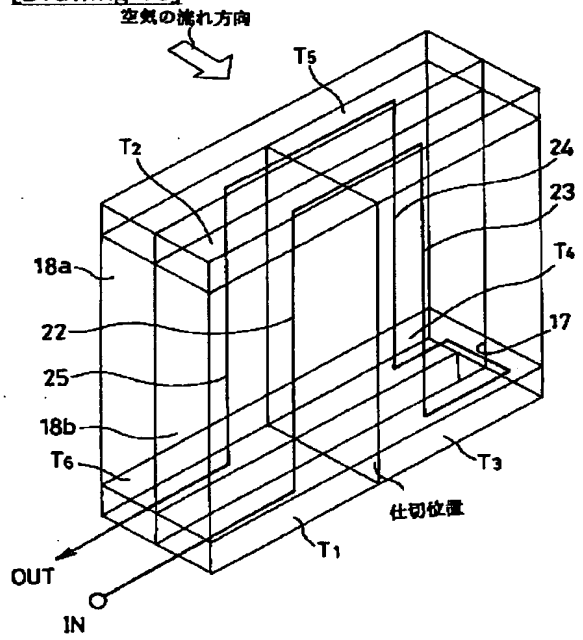
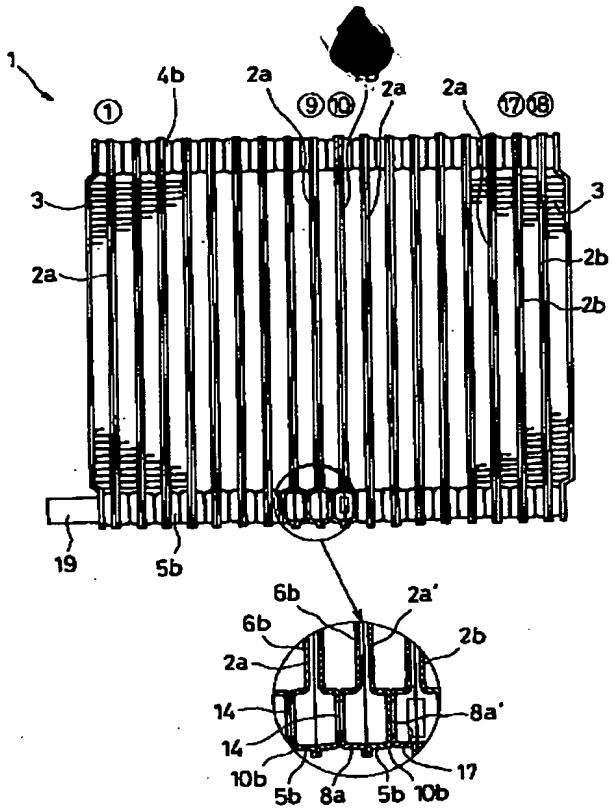
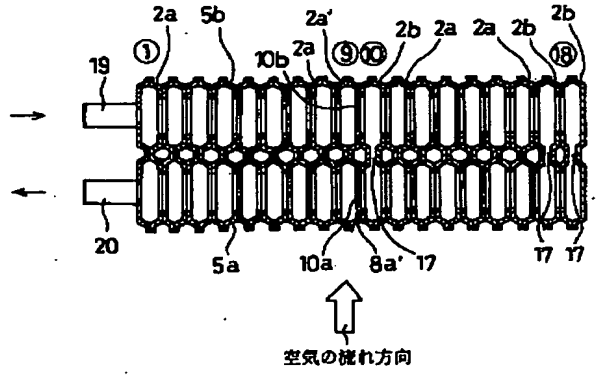


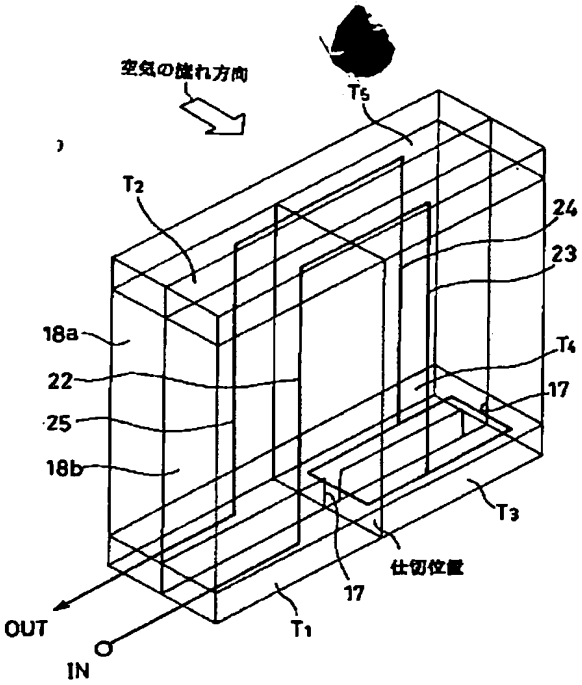
[Drawing 17]



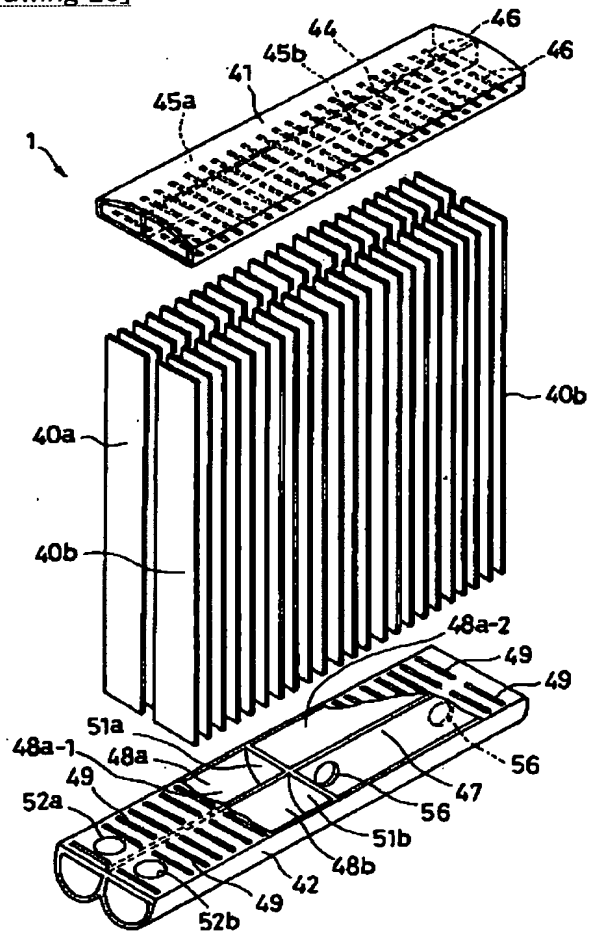
[Drawing 18]



[Drawing 19]



[Drawing 20]



[Translation done.]